

REMARKS

This is intended as a full and complete response to the Final Office Action dated November 12, 2009, having a shortened statutory period for response set to expire on February 12, 2010. Please reconsider the claims pending in the application for reasons discussed herein.

Claims 1, 4-9, 33, 34, 36, 37, and 51-57 are rejected and claims 38-43 and 58-63 are allowed.

Claims 1, 4-9, 33, 34, 36-43, and 51-63 remain pending in the application after entry of this response. The claims have not been amended

Claim Rejections Under 35 USC § 103

Claims 1, 4-9, 33, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Buchanan* (US 2002/0066568) in view of *Eno* (US 5,923,111) and *Kawabata* (US 6,025,691). Applicant respectfully traverses the rejection. *Buchanan*, *Eno*, and *Kawabata*, either alone or in combination, do not teach, suggest, or disclose each of the at least three phases being continuously driven by a cyclically smoothly varying non-sinusoidal voltage applied to the corresponding motor phase during driving of the motor, as recited in claim 1. *Buchanan* and *Eno* do not discuss the waveforms associated with the motor.

Kawabata discloses (Fig. 11) driving a motor phase using a zero-ripple current waveform at low speed and a trapezoidal current waveform at high speed (see Fig. 10 and col. 10, line 13-col. 11, line 18). The trapezoidal waveform can hardly be characterized as smoothly varying due to discontinuities at the corners. Further, *Kawabata* discloses current waveforms, not voltage waveforms. Therefore, claim 1 and its dependents are patentable over *Buchanan*, *Eno*, and *Kawabata*.

Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Buchanan* in view of *Eno* and *Kawabata* and further in view of *Iijima* (US 6,462,491). *Buchanan*, *Eno*, *Kawabata*, and *Iijima*, either alone or in combination, do not teach, suggest, or disclose each of the at least three phases being continuously driven by a

cyclically smoothly varying non-sinusoidal voltage applied to the corresponding motor phase during driving of the motor, as recited in claim 1. *Iijima* discloses sinusoidal waveforms (Figures 8 and 28). Therefore, claim 1 and its dependents are patentable over *Buchanan*, *Eno*, *Kawabata*, and *Iijima*.

Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Buchanan* in view of *Eno* and *Kawabata*, and further in view of *Endo* (US 4,879,502). *Buchanan*, *Eno*, *Kawabata*, and *Endo*, either alone or in combination, do not teach, suggest, or disclose each of the at least three phases being continuously driven by a cyclically smoothly varying non-sinusoidal voltage applied to the corresponding motor phase during driving of the motor, as recited in claim 1. *Endo* does not discuss the waveforms associated with the motor. Therefore, claim 1 and its dependents are patentable over *Buchanan*, *Eno*, *Kawabata*, and *Endo*.

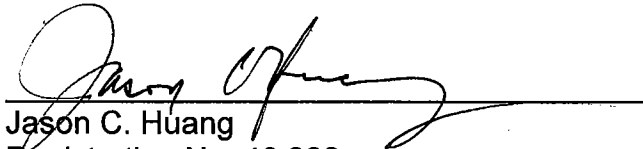
Claims 51-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Buchanan* in view of *Eno* and *Lamaster* (US 4,467,261). Applicant respectfully traverses the rejection. The Examiner states that *Lamaster* teaches that it is known in the art for AC motors to have a chopper and an inverter. *Lamaster* (col. 1, lines 5-29) teaches the use of an adjustable frequency power supply for an A.C. motor wherein the adjustable frequency power supply includes a rectifier and an inverter to generate A.C. at the correct frequency to achieve a given desired motor speed. Furthermore, *Lamaster* teaches that a chopper circuit may be employed between the rectifier and the inverter to deliver variable voltage D.C. power to the inverter and thereby assure a constant flux density is maintained by maintaining a constant ratio of terminal motor voltage to motor frequency to compensate for changes in frequency. In contrast, the chopper, as recited in claim 51, is employed to provide an efficient means of regulating the internal drive voltage and hence the speed of a motor for a downhole submersible pump over a pump power range of interest over a range of operating speeds greater than 4,500 rpm wherein the motor is driven with medium voltages commonly in the range of 1000 V AC - 4000 V AC via a long power cable to avoid the requirement of a step-up transformer. Accordingly, the motivation for using the chopper of the present invention has nothing to do with maintaining a constant ratio of terminal motor voltage to

motor frequency as taught by *Lamaster* and when faced with the problem of how to drive a high speed downhole submersible pump efficiently over a pump power range of interest over a range of operating speeds greater than 4,500 rpm without the use of a step-up transformer, one skilled in the art would not have been motivated to use a chopper in view of the teachings of *Lamaster*. Therefore, claim 51 and its dependents are patentable over *Buchanan*, *Eno*, and *Lamaster*.

Conclusion

Having addressed all issues set out in the office action, Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



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